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A PONDEROSA PINE GROWTH RATE CLASSIFICATION

by
W.G. Thomson

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THE CLASSIFICATION

An attempt is here made to build a classification broad enough to cover all types of ponderosa pine trees found on all sites in the Region, yet keeping the separate classes distinct enough for easy identification in the field. It has been observed that generally the rate of growth of a tree is proportional to its physiological age and amount of leaf surface area. Hence, this classification divides all trees into age classes each of which is subdivided into vigor classes.

Age Classes

Differences in site, aspect and amount and distribution of available moisture cause trees to mature at different rates, thus influencing the rate of growth. Because of these differences, the pine of the Southwest seems to mature at an earlier age than the pine of the Coastal region. Hence, the approximate age limits vary somewhat in this description from those set down by Keen. The external appearance of the tree indicates the physiological age rather than the exact age, hence more weight should be given to relative maturity than to the actual age as indicated by the annual rings. As the trees must be judged entirely by external appearance those having all of the outward characteristics of an age class should be placed in that class even if they are somewhat older or younger than the designated limits. By limiting Age Class 1 to trees under 12 inches in diameter we automatically eliminate that group when considering trees merchantable for sawtimber. The four age classes are outlined as follows:

1. Young Blackjacks, usually less than 75 years

D. B. H. Under 12 inches.

BARK: Dark gray to black, deeply furrowed with narrow ridges between the fissures.

TOPS: Usually pointed.

BRANCHES: Upturned and whorls distinct.

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EXPERIMENT STATION

2. Blackjacks, usually less than 150 years.

D. B. H.	Seldom over 24 inches.
BARK:	Black to dark reddish brown with ridges or very narrow plates between the fissures.
TOPS:	Pointed or slightly rounding; never flat.
BRANCHES:	Mostly upturned and whorls distinct for upper half of crown flattening out with less distinct whorls in lower half.

3. Intermediate-Mature, approximately from 150 to 225 years.

D. B. H.	Usually less than 36 inches.
BARK:	Reddish brown, shading to black in the top with moderately large plates between the fissures.
TOPS:	Usually pyramidal or rounded, occasionally pointed.
BRANCHES:	Upturned in upper third of crown; those in the middle horizontal, and drooping in lower third of the crown. Whorls incomplete and indistinct except at top.

4. Mature-Overmature, approximately 225 years and over.

D. B. H.	Usually large.
BARK:	Reddish brown to yellow carrying the color well into the top; the plates usually very wide, long and smooth.
TOPS:	Usually flat and making no further height growth.
BRANCHES:	Mostly large drooping, gnarled or crooked. Whorls indistinct and incomplete.

The principal points of difference between the age groups are the character and color of the bark, the shape of the top of the crown, and the branching habit. A tree has a pointed crown if the leader maintains a faster growth rate than do the laterial branches near the top. An intermediate or suppressed blackjack may have a rounded crown if the tree is so crowded that the leader is not growing faster than the laterals.

Vigor Classes

Eminent silviculturists have frequently stated that the rate of growth of a tree is directly proportional to the area of leaf surface. With this in mind, this classification is intended to group the trees into classes according to their relative rates of growth, from the best, represented by the A Class, to the poorest, represented by the D Class. In judging the relative growth rate or vigor of different trees within a given age class the size of crown and the abundance and condition of the needles are the best outward indicators. The growth is less if the needles are short, as the total needle or leaf area is less than if they were of normal length. Also, the growth is retarded if the needles are sickly, as indicated by excessively slim and poorly colored needles, because the normal functions of the leaf are impaired.

After accepting Keen's lower limit for Class A trees of a thrifty crown of 55 percent of the total height, our investigations of the local trees, the growth of which was checked by increment borings, furnished the percentage limits used in the following class descriptions. The percentages hold only for rather symmetrical and thrifty crowns in which the foliage is of good density for the class and of average length.

The four vigor classes are defined as follows:

A - FULL

CROWN: Well filled out vigorous crown with a length 55 percent or more of the total height of the tree and of average width or wider.

FOLIAGE: Usually very dense and thrifty, the individual leaves being of average length or longer, or if the crown is much longer than 55 percent a medium density of foliage will have about the same total leaf area.

POSITION: Usually isolated or dominant.

D. B. H. Large for age.

B - MEDIUM

CROWN: Fair to moderately vigorous crown with length less than 55 percent, but 35 percent or more, of the heigth of the tree, or a longer crown if narrow or somewhat thin. Either short wide crowns or long narrow ones, but neither sparse nor ragged.

FOLIAGE: Usually thrifty, of full to medium density and of average length.

POSITION: Usually codominant but often isolated or dominant.

D. B. H. Above average for age.

C - LIGHT

CROWN: Of fair to poor vigor either short (from 20 to 35 percent of the height of the tree, if foliage is of average thrift) or long, sparse and narrow.

FOLIAGE: Usually short and from medium to poor density. Of normal length and density when confined to the top third of the tree.

POSITION: Usually intermediate or sometimes codominant, but rarely isolated.

D. B. H. Usually below average.

D - WEAK

CROWN: Usually of very poor vigor, often quite thin and sickly or consisting of a tuft at the top of the tree (less than 20 percent of total height of tree).

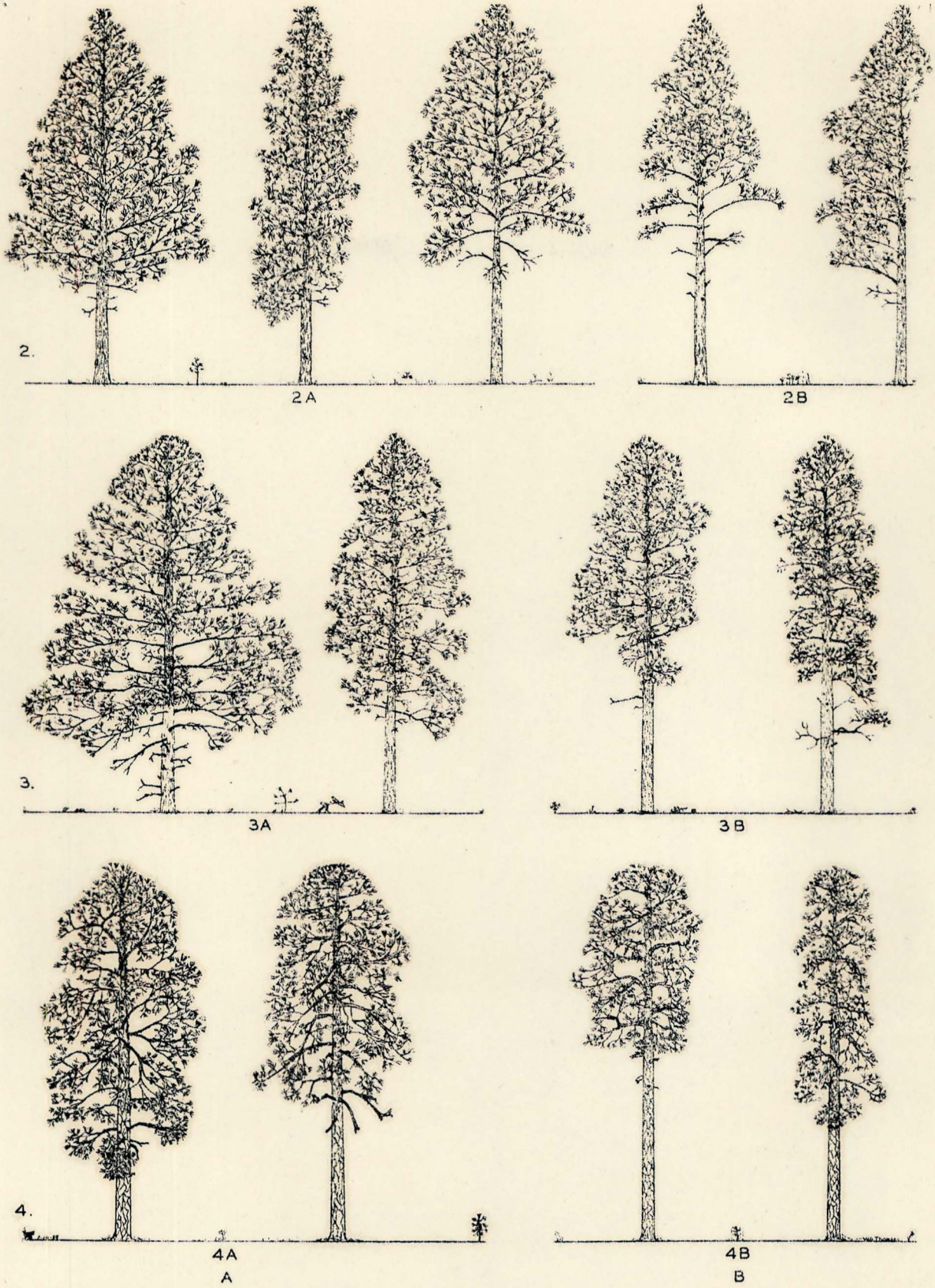
FOLIAGE: Usually short and of poor to very poor density, very sparse and scattered or only partially developed; often barely sufficient to maintain life.

POSITION: Usually suppressed or intermediate or if dominant or codominant it is suffering from some vigor reducing ailment such as insect attack, lightning strike or very old age.

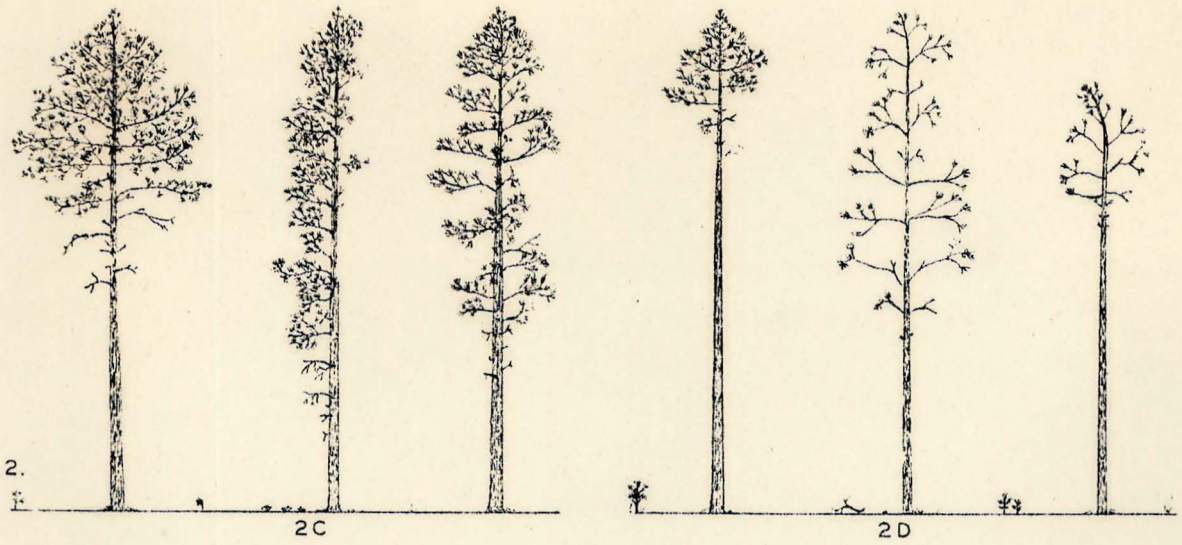
D. B. H. Usually decidedly subnormal, but very old and damaged trees are often of large diameter.

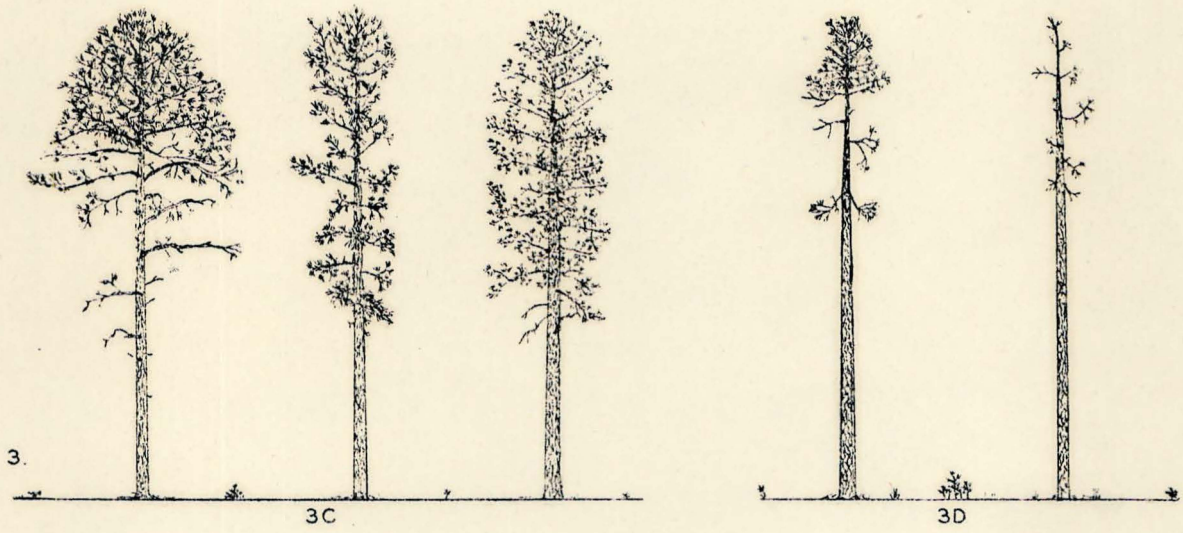
AGE CLASS I TREES. ALL CROWN CLASSES.

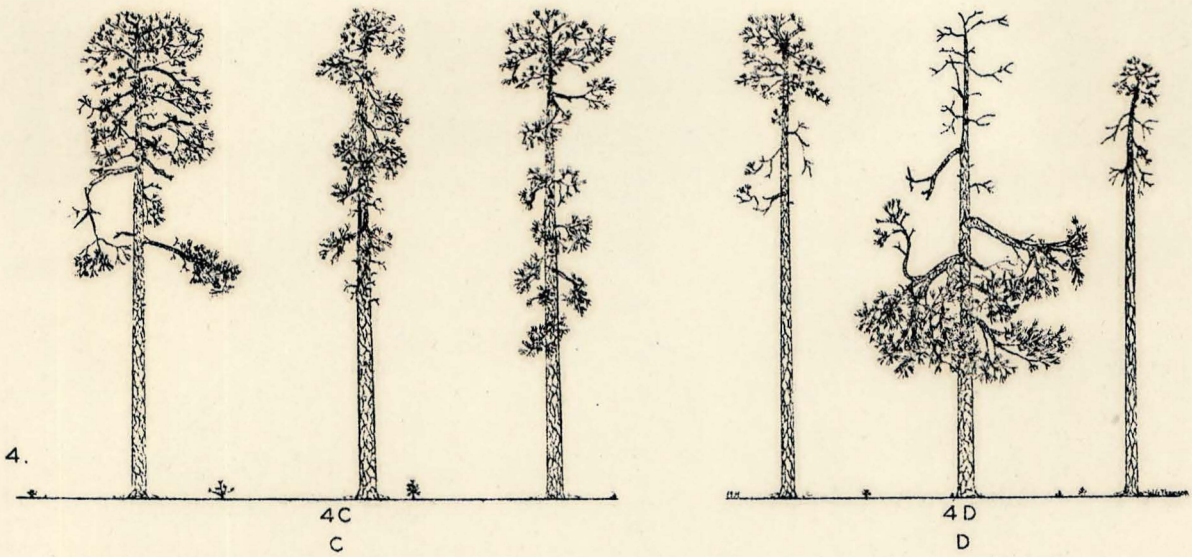
THIS COMPOSITE SKETCH SHOWS THE NATURAL GROUPING OF THE YOUNGER AGE CLASSES, COMMON IN CLASS I AND 2. THE GROWTH RATE OF THE TREES DIMINISHES AS THE DENSITY OF THE GROUP INCREASES BECAUSE THE LEAF SURFACE AREA BECOMES LESS AS PORTIONS OF THE CROWN ARE SHADED OFF. THIS IS ILLUSTRATED BY THE RELATIVE POSITION OF THE VARIOUS CROWN CLASSES.



A PONDEROSA PINE GROWTH RATE CLASSIFICATION CHART FOR THE COMPARISON OF AGE AND VIGOR CLASSES ARRANGED IN THE ORDER OF THEIR DECLINING RATES OF GROWTH FROM LEFT TO RIGHT, FROM TOP TO BOTTOM. ADAPTED FROM KEEN'S "BARK BEETLE SUSCEPTIBILITY CLASSIFICATION."







A PONDEROSA PINE GROWTH RATE CLASSIFICATION CHART.

KW P

Albuquerque, New Mexico,

January 30, 1939

S
Sales
Sale Policy
(Ponderosa Pine)

MEMORANDUM FOR FOREST SUPERVISORS

Reference is made to our memorandum of June 9, 1937, which transmitted a copy of the Acting Chief's letter of April 29, 1937,

The Acting Chief's letter, 1st paragraph, page 2, referred to Keen's tree classification. A study of local stands indicated that while the general principles of this classification applied, in many minor respects they differed from the same species in the Northwest. Consequently, new definitions for the several age and vigor classes were necessary for the proper classification of ponderosa pine stands in Arizona and New Mexico. The results of the local studies are now available and definitions prepared. It was thought that men not dealing with such classifications would have difficulties if only definitions were given. It was considered necessary to give visual help through the medium of line drawings illustrating the several age and vigor classes. These drawings have been prepared from some 80 photographs and will, with a study of the definitions, make classification much easier. The definitions and drawings are attached.

Studies made of a considerable number of trees both in virgin and cutover stands show that growth is greater in the Class 2 trees, somewhat less in the Class 3 and still smaller in the Class 4. Class 1 trees are below 12 inches d.b.h. and, therefore, are not here considered. Growth is greatest in the Class A trees and is least in the D Class. The total growth that may be expected from a cutover stand will depend upon the age and vigor classes making up the reserved stand. No two stands will be exactly alike. One study shows that growth of the several age and vigor classes is as follows:

Normal Annual Diameter Growth of
Coulter Plot Trees after Cutting

	GROWTH VIGOR CLASS			
AGE CLASS	A	B	C	D
2 (Immature)	.246"	.173"	.164"	.109"
3 (Mature)	.159"	.130	.106	.062
4 (Overmature)	.137	.098	.068	.051

This will illustrate the influence of age and vigor on growth and will give the basic reasons for classifications.

It is essential in view of the present Service policy that we become thoroughly familiar with the several age and vigor classes and be able to recognize them on the ground.

Sufficient copies of the definitions and drawings are attached to permit you to supply each of the men on your forest doing timber managmment work with a copy. You may send them with such additional instructions as you care to make.

George W. Kimball

GEORGE W. KIMBALL
Acting Regional Forester

Enclosures